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Java Assignment No 2

1) Write a program to create a class named Vehicle having protected instance variables regnNumber, speed, color, ownerName and a method showData ( ) to show "This is a vehicle class". Inherit the Vehicle class into subclasses named Bus and Car having individual private instance variables routeNumber in Bus and manufacturerName in Car and both of them having showData ( ) method showing all details of Bus and Car respectively with content of the super class's showData ( ) method.

```
import java.util.Scanner;
class vehicle {

  Scanner sc = new Scanner(System.in);
  protected int RegNo, speed;
  protected String color, ownerName;

  public void showData() {
    System.out.println("This is a vehicle class");
  }
}

class Bus extends vehicle {

  private int routenNo;

  public void getData() {
    System.out.print("Enter Reg No: ");
    RegNo = sc.nextInt();
    System.out.print("Enter Speed : ");
    speed = sc.nextInt();
    System.out.print("Enter Color : ");
    color = sc.next();
    System.out.print("Enter Owner Name : ");
    ownerName = sc.next();
    System.out.print("Enter Route No : ");
    routenNo = sc.nextInt();
    super.showData();
  }
```

```
  public void showData() {
    System.out.println("\nBus Information\n");
    System.out.println("Reg No: " + RegNo);

    System.out.println("Speed : " + speed);

    System.out.println("Color : " + color);

    System.out.println("Owner Name : " + ownerName);

    System.out.println("Route No : " + routenNo);
  }
}

class Car extends vehicle {

  private String manufacturerName;

  public void getData() {

    System.out.print("\nEnter Reg No: ");
    RegNo = sc.nextInt();
    System.out.print("Enter Speed : ");
    speed = sc.nextInt();
    System.out.print("Enter Color : ");
    color = sc.next();
    System.out.print("Enter Owner Name : ");
    ownerName = sc.next();
    System.out.print("Enter Manufacturer Name : ");
    manufacturerName = sc.next();
    super.showData();
  }

  public void showData() {
    System.out.println("\nCar Information\n");
    System.out.println("Reg No: " + RegNo);

    System.out.println("Speed : " + speed);

    System.out.println("Color : " + color);

    System.out.println("Owner Name : " + ownerName);

    System.out.println("Manufacturer Name : " + manufacturerName);
  }
}

public class Assignment2Q1 {
```

```
  public static void main(String[] args) {
    Bus b = new Bus();
    b.getData();
    b.showData();

    Car c = new Car();
    c.getData();
    c.showData();
  }
}
```

Output:

Enter Reg No: 101

Enter Speed : 90

Enter Color : Red

Enter Owner Name : Amit

Enter Route No : 87

This is a vehicle class

Bus Information

Reg No: 101

Speed : 90

Color : Red

Owner Name : Amit

Route No : 87

Enter Reg No: 567

Enter Speed : 80

Enter Color : White

Enter Owner Name : Ajinkya

Enter Manufacturer Name : Sahdev

This is a vehicle class

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Car Information

Reg No: 567

Speed : 80

Color : White

Owner Name : Ajinkya

Manufacturer Name : Sahdev

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2)Create abstract class Shape with abstract method area().Write a Java program to calculate are of Rectangle and Triangle.(Inherit Shape class in classes Rectangle and Triangle).

```
import java.util.Scanner;
abstract class shape {
abstract void area();
}
class Rectangle extends shape {
int l, b;

Rectangle(int l, int b) {
this.l = l;
this.b = b;
}

public void area() {
int area = l * b;
System.out.println("Area of Rectangle : " + area);
}
}

class Triangle extends shape {
int base, height;
Triangle(int base, int height) {
this.base = base;
this.height = height;
}
public void area() {
double area = 0.5 * (base * height);
System.out.println("Area of Triangle : " + area);
}
}
public class Assignment2Q2 {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.println("Enter length & breadth of Rectangle : ");
int a = sc.nextInt();
int b = sc.nextInt();
Rectangle r = new Rectangle(a, b);
r.area();

System.out.println("Enter Base & Height of Triangle : ");
int x = sc.nextInt();
int y = sc.nextInt();
Triangle t = new Triangle(x, y);
t.area();
sc.close();
}
```

```
}
```

Output :

```
Enter length & breadth of Rectangle :
4
5
Area of Rectangle : 20
Enter Base & Height of Triangle :
5
4
Area of Triangle : 10.0
```

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3)Write a java program to calculate area of Cylinder and Circle.(Use super keyword).

```
import java.util.Scanner;
class staff {
  int r, h;
  final double pi = 3.142;

  staff(int r) {
    this.r = r;
  }

  staff(int r, int h) {
    this.r = r;
    this.h = h;
  }
}
class circle extends staff {
  public circle(int r) {
    super(r);
  }

  public void area() {
    double area = pi * r * r;
    System.out.println("Area of Circle : " + area);
  }
}
class cylinder extends staff {

  public cylinder(int r, int h) {
    super(r, h);
  }
  public void area() {
    double area = 2 * pi * r * h + 2 * pi * r * r;
    System.out.println("Area of Cylinder: " + area);
  }
}
public class Assignment2Q3 {

  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("\nCircle");
    System.out.println("Enter Radius : ");
    int r = sc.nextInt();
    circle c = new circle(r);
    c.area();

    System.out.println("\nCylinder");
    System.out.println("Enter Radius : ");
```

```
    int rc = sc.nextInt();
    System.out.println("Enter Height : ");
    int h = sc.nextInt();
    cylinder cyl = new cylinder(rc, h);
    cyl.area();

    sc.close();
  }
}
```

Output:

Circle

Enter Radius :

5

Area of Circle : 78.55

Cylinder

Enter Radius :

5

Enter Height :

5

Area of Cylinder: 314.2

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4)Define an Interface Shape with abstract method area(). Write a java program to calculate an area of Circle and Sphere.(use final keyword)

```
import java.util.*;
interface shape {
  void area(int r);
  final double pi = 3.142;
}
class Circle implements shape {
  public void area(int r) {
    double area = pi * r * r;
    System.out.println("Area of Circle : " + area);
  }
}
class Sphere implements shape {
  public void area(int r) {
    double area = 4 * pi * r * r;
    System.out.println("Area of Sphere : " + area);
  }
}
public class Assignment2Q4 {
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Radius : ");
    int r = sc.nextInt();

    Circle c = new Circle();
    c.area(r);

    Sphere s = new Sphere();
    s.area(r);
    sc.close();
  }
}
```

Output:

Enter Radius :
5
Area of Circle : 78.55
Area of Sphere : 314.2

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5)Create an abstract class Shape with methods calc_area() & calc_volume(). Derive two classes Sphere(radius)& Cone(radius, height) from it. Calculate area and volume of both. (Use Method Overriding)

```
import java.util.Scanner;
abstract class shape {

  final double pi = 3.142;

  abstract void calc_area();

  abstract void calc_volume();
}

class sphere extends shape {

  int radius;

  sphere(int radius) {
    this.radius = radius;
  }

  @Override
  void calc_area() {
    double area = 4 * pi * radius * radius;
    System.out.println("Area of Sphere : " + area);
  }

  @Override
  void calc_volume() {
    double volume = (4 / 3) *( pi * radius * radius * radius);
    System.out.println("Volume of Sphere : " + volume);
  }
}

class cone extends shape {

  int radius, height;

  cone(int radius, int height) {
    this.radius = radius;
    this.height = height;
  }

  @Override
  void calc_area() {
    double area_cone = pi * radius * height;
    System.out.println("Area of Cone : " + area_cone);
  }
```

```
  @Override
  void calc_volume() {
    double vol = (pi * radius * radius * height) / 3;
    System.out.println("Volume of Cone is :" + vol);
  }
}
public class Assignment2Q5 {
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Radius : ");
    int r = sc.nextInt();
    sphere s = new sphere(r);
    s.calc_area();
    s.calc_volume();

    System.out.println("Enter Height : ");
    int h = sc.nextInt();

    cone c = new cone(r, h);
    c.calc_area();
    c.calc_volume();
    sc.close();
  }
}
```

Output:

Enter Radius :
5
Area of Sphere : 314.2
Volume of Sphere : 392.75

Enter Height :
5
Area of Cone : 78.55
Volume of Cone is :130.91666666666666

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6)Define an abstract class Staff with members name &address. Define two sub classes FullTimeStaff(Departmet, Salary) and PartTimeStaff(numberOfHours, ratePerHour). Define appropriate constructors. Create n objects which could be of either FullTimeStaff or PartTimeStaff class by asking the user's choice. Display details of FulltimeStaff and PartTimeStaff.

```
import java.util.Scanner;
abstract class Staff {

  String mem_name, address;

  abstract void display();

  Staff(String mem_name, String address) {
    this.mem_name = mem_name;
    this.address = address;
  }
}

class FullTimeStaff extends Staff {

  String Dept;
  int Sal;

  FullTimeStaff(String mem_name, String address, String Dept, int Sal) {
    super(mem_name, address);
    this.Dept = Dept;
    this.Sal = Sal;
  }

  @Override
  void display() {
    System.out.println(
      mem_name + "\t\t" + address + "\t\t" + Dept + "\t\t" + Sal
    );
  }
}

class PartTimeStaff extends Staff {

  int NOH, RPH;

  PartTimeStaff(String mem_name, String address, int NOH, int RPH) {
    super(mem_name, address);
    this.NOH = NOH;
    this.RPH = RPH;
  }

  @Override
```

```
  void display() {
    System.out.println(mem_name + "\t\t" + address + "\t\t" + (NOH * RPH));
  }
}

public class Assignment2Q6 {

  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);

    int ch;
    do {
      System.out.println("\n1.FullTimeStaff \n2.PartTimeStaff");
      System.out.println("Enter Your choice : ");
      ch = sc.nextInt();
      switch (ch) {
        case 1:
          System.out.println("Enter No of Member : ");
          int n = sc.nextInt();
          FullTimeStaff[] ft = new FullTimeStaff[n];

          for (int i = 0; i < n; i++) {
            System.out.println("\nEnter " + (i + 1) + " member Information : ");
            System.out.print("Enter Member Name : ");
            String name = sc.next();
            System.out.print("Enter Address :");
            String add = sc.next();
            System.out.print("Enter Department : ");
            String dept = sc.next();
            System.out.print("Enter Salary : ");
            int sal = sc.nextInt();
            ft[i] = new FullTimeStaff(name, add, dept, sal);
          }
          System.out.println(
            "Member Name" +
            "\t" +
            "Address" +
            "\t\t" +
            "Department" +
            "\t" +
            "Salary"
          );
          for (int i = 0; i < n; i++) {
            ft[i].display();
          }

          break;
        case 2:
          System.out.println("Enter No of Member : ");
```

```
        int n1 = sc.nextInt();
        PartTimeStaff[] pt = new PartTimeStaff[n1];

        for (int i = 0; i < n1; i++) {
          System.out.println("\nEnter " + (i + 1) + " member Information : ");
          System.out.print("Enter Member Name : ");
          String name = sc.next();
          System.out.print("Enter Address :");
          String add = sc.next();
          System.out.print("Enter No of Hour : ");
          int noh = sc.nextInt();
          System.out.print("Enter Rate Per Hour : ");
          int rph = sc.nextInt();
          pt[i] = new PartTimeStaff(name, add, noh, rph);
        }
        System.out.println(
          "\nMember Name" + "\t" + "Address" + "\t\t" + "Salary"
        );
        for (int i = 0; i < n1; i++) {
          pt[i].display();
        }

        break;
      }
    } while (ch < 3);
    sc.close();
  }
}
```

Output:

```
1.FullTimeStaff
2.PartTimeStaff
Enter Your choice :
1
Enter No of Member :
2

Enter 1 member Information :
Enter Member Name : Sahul
Enter Address :Pune
Enter Department : Mca
Enter Salary : 23456

Enter 2 member Information :
Enter Member Name : Rahul
Enter Address :Nigdi
Enter Department : Mba
Enter Salary : 34232
Member Name     Address         Department      Salary
```

Sahul	Pune	Mca	23456
Rahul	Nigdi	Mba	34232

1.FullTimeStaff
2.PartTimeStaff
Enter Your choice :
2
Enter No of Member :
2

Enter 1 member Information :
Enter Member Name : Nayan
Enter Address :Pune
Enter No of Hour : 5
Enter Rate Per Hour : 400

Enter 2 member Information :
Enter Member Name : Shaman
Enter Address :Nigdi
Enter No of Hour : 4
Enter Rate Per Hour : 300

Member Name	Address	Salary
Nayan	Pune	2000
Shaman	Nigdi	1200

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7)Create a package Mathematics with two classes Maximum and Power. Write a java program to accept two numbers from user and perform the following operations on it: a. Find Maximum of two numbers. b. Calculate the power (X, Y);

```
import math.*;
import java.util.*;
public class Assignment2Q7 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter two No :" );
        int a=sc.nextInt();
        int b= sc.nextInt();

        max m = new max(a,b);
        m.display();

        pow p = new pow(a,b);
        p.disp();
        sc.close();
    }
}
```

//max.java

```
package math;
public class max {
    int a,b;
    public max(int a,int b){
        this.a=a;
        this.b=b;
    }
    public void display(){
        if (a>b) {
            System.out.println("a is max");
        } else {
            System.out.println("b is max");
        }
    }
}
```

//pow.java

```
package math;
public class pow {
  int N, P;
  public pow(int a, int b) {
    N = a;
    P = b;
  }

  public void disp() {
```

```
    int pow = 1;
    for (int i = 1; i <= P; i++) {
      pow = pow * N;
    }
    System.out.println("Power of "+N+ " is :"+pow);
  }
}
```

Output:

Enter two No :
5
3
a is max
Power of 5 is :125

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8)Create a package vehicle which will have 2 classes as class two-wheeler and four-wheeler. Twowheeler with method disp. (cc, price), Four-wheeler with method show (regno., regyear).

```
import java.util.*;
import math.*;

public class Assignment2Q8 {

  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("\nEnter CC : ");
    int cc = sc.nextInt();
    System.out.println("Enter Price : ");
    int price = sc.nextInt();

    TwoWheeler tw = new TwoWheeler();
    tw.disp(cc, price);

    System.out.println("\nEnter Reg No : ");
    int regNo = sc.nextInt();
    System.out.println("Enter Reg Year : ");
    int regYear = sc.nextInt();
    FourWheeler fw = new FourWheeler();
    fw.show(regNo, regYear);
  }
}

//TwoWheeler.java
package math;
public class TwoWheeler {
  public void disp(int cc, int price) {
    System.out.println("\nCC of Bike : " + cc);
    System.out.println("Price of Bike : " + price);
  }
}


//FourWheeler.java
package math;
public class FourWheeler {
    public void show(int regno, int  regyear) {
        System.out.println("\nReg No : " + regno);
        System.out.println("Reg Year : " + regyear);
      }
}
```

Output:

```
Enter CC :
150
```

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Enter Price :
56789

CC of Bike : 150
Price of Bike : 56789

Enter Reg No :
234
Enter Reg Year :
2022

Reg No : 234
Reg Year : 2022

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9) Write a package for Games in Java, which have two classes Indoor and Outdoor. Use a function display () to generate the list of players for the specific games. (Use Parameterized constructor, finalize() method and Array Of Objects)

```
import java.util.Scanner;
import math.*;
public class Assignment2Q9{

  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);

    int ch;
    do {
      System.out.println("\n1.Indoor \n2.Outdoor\n\nEnter Your Choice : ");
      ch = sc.nextInt();

      switch (ch) {
        case 1:
          System.out.println("Enter how many players : ");
          int n = sc.nextInt();

          Indoor[] in = new Indoor[n];

          System.out.println("\nEnter " + n + " Indoor Player Name : ");
          for (int i = 0; i < in.length; i++) {
            String p_name = sc.next();
            in[i] = new Indoor(p_name);
          }
          System.out.println("\nIndoor Games : ");
          for (int j = 0; j < in.length; j++) {
            in[j].display();
          }
          break;
        case 2:
          System.out.println("Enter how many players : ");
          int n1 = sc.nextInt();
          Outdoor[] out = new Outdoor[n1];

          System.out.println("\nEnter " + n1 + " Outdoor Player Name : ");
          for (int i = 0; i < out.length; i++) {
            String p_name = sc.next();
            out[i] = new Outdoor(p_name);
          }
          System.out.println("\nOutdoor Games : ");
          for (int j = 0; j < out.length; j++) {
            out[j].display();
          }
        default:
          break;
```

```
      }
    } while (ch < 3);

    sc.close();
  }
}
```

//Indoor.java

```
package math;

public class Indoor {

  String player;

  public Indoor(String player) {
    this.player = player;
  }
  public void display() {
    System.out.println(player);
  }
  protected void finalize() {
    System.out.println("Finalize is called");
  }
}
```

//Outdoor.java

```
package math;

public class Outdoor {
    String player;

    public Outdoor(String player) {
      this.player = player;
    }
    public void display() {
      System.out.println(player);
    }
    public void finalize() {
      System.out.println("Finalize is called");
    }
}
```

Output :

```
1.Indoor
2.Outdoor

Enter Your Choice :
1
Enter how many players :
```

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3

Enter 3 Indoor Player Name :
Nikita
Ruchi
Smita

Indoor Games :
Nikita
Ruchi
Smita

1.Indoor
2.Outdoor

Enter Your Choice :
2
Enter how many players :
3

Enter 3 Outdoor Player Name :
Swayam
Prasad
Rahul

Outdoor Games :
Swayam
Prasad
Rahul

1.Indoor
2.Outdoor
Enter Your Choice :

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10)Write a java program to accept a number from user, If it is greater than 100 then throw user defined exception "Number is out of Range" otherwise do the addition of digits of that number. (Use static keyword)

```
import java.util.Scanner;

class NoOutOfRange extends Exception {}

public class Assignment2Q10 {

  static int n;

  public static void main(String[] args) throws NoOutOfRange {
    Scanner sc = new Scanner(System.in);
    int sum = 0, r;
    System.out.println("Enter No : ");
    int no = sc.nextInt();
    n = no;
    if (no > 100) {
      throw new NoOutOfRange();
    } else {
      while (no > 0) {
        r = no % 10;
        sum = sum + r;
        no = no / 10;
      }
      System.out.println("Sum of digits in " + n + " is : " + sum);
    }

  }
}
```

Output:

```
Enter No :
89
Sum of digits in 89 is : 17

Enter No :
143
Exception in thread "main" NoOutOfRange
        at Assignment2Q10.main(Assignment2Q10.java:17)
```

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11)Write a java program to validate PAN number and Mobile Number. If it is invalid then throw user defined Exception "Invalid Data", otherwise display it.

```
import java.util.Scanner;

class Invalid_Data extends Exception {}

public class Assignment2Q11 {

 static int n;

 public static void main(String[] args) {
  Scanner sc = new Scanner(System.in);
  try {
   do {
    System.out.println("\n1.Phone Number \n2.PAN Number ");
    System.out.println("Enter Your Choice : ");
    n = sc.nextInt();
    switch (n) {
     case 1:
      System.out.println("Enter Phone Number : ");
      Long ph = sc.nextLong();
      if (ph.toString().matches("(0/91)?[7-9][0-9]{9}")) {
       System.out.println("Enterred Phone No " + ph + " is Correct");
      } else {
       throw new Invalid_Data();
      }
      break;
     case 2:
      System.out.println("Enter PAN Number : ");
      String pan = sc.next();
      if (pan.matches("[A-Z]{5}[0-9]{4}[A-Z]{1}")) {
       System.out.println("Enterred Pan No " + pan + " is Correct");
      } else {
       throw new Invalid_Data();
      }
      break;
     default:
      throw new Invalid_Data();
    }
   } while (n < 3);
  } catch (Invalid_Data id) {
   System.out.println("Invalid Credentials");
  } finally {
   sc.close();
  }
 }
}
```

Output :

1.Phone Number
2.PAN Number
Enter Your Choice :
1
Enter Phone Number :
7218438402
Enterred Phone No 7218438402 is Correct

1.Phone Number
2.PAN Number
Enter Your Choice :
2
Enter PAN Number :
ERGFD2030D
Enterred Pan No ERGFD2030D is Correct

1.Phone Number
2.PAN Number
Enter Your Choice :
3
Invalid Credentials

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12.Write a program in java to enter the number through command line argument if first and second number is not entered it will generate the exception. Also divide the first number with second number and generate the arithmetic exception .

```
public class Assignment2Q12 {
  public static void main(String[] args) {

    try {
      int i = Integer.parseInt(args[0]);
      int j = Integer.parseInt(args[1]);
      double div = i / j;
      System.out.println("Division of " + i + " & " + j + " is :" + div);
    } catch (ArrayIndexOutOfBoundsException e) {
      System.out.println("Please Enter Two Numbers through Command Line\n"+e);
    }
  }
}
```

Output :

```
PS C:\Users\shubham Deshmukh\Desktop\MCA\Java\program> javac
Assignment2Q12.java
PS C:\Users\shubham Deshmukh\Desktop\MCA\Java\program> java
Assignment2Q12
Please Enter Two Numbers through Command Line
java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0
PS C:\Users\shubham Deshmukh\Desktop\MCA\Java\program> java
Assignment2Q12 6 3
Division of 6 & 3 is :2.0
```

Div - B
Name - Shubham Kailas Deshmukh
Roll No - 120

13) Write a program that generates a custom exception if age entered for voting in election is less than 18 years.

```
import java.util.Scanner;
class Invalid_Data extends Exception {

}
public class Assignment2Q13 {

  public static void main(String[] args) throws Invalid_Data {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Age : ");
    int age = sc.nextInt();

    if (age < 18) {
      throw new Invalid_Data();
    } else {
      System.out.println("You Can vote !");
    }

  }
}
```

Output:

```
Enter Age :
15
Exception in thread "main" Invalid_Data
        at Assignment2Q13.main(Assignment2Q13.java:16)
Enter Age :
21
You Can vote !
```

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14)Create an interface called Player. The interface has an abstract method called play() that displays a message describing the meaning of "play" to the class. Create classes called Child, Musician, and Actor that all implement Player. Create an application that demonstrates the use of the classes(UsePlayer.java)

```
interface Player {
  void play();
}

class Child implements Player {

  @Override
  public void play() {
    System.out.println("Child plays with Lego.");
  }
}

class Musician implements Player {

  @Override
  public void play() {
    System.out.println("Musician plays a piano.");
  }
}

class Actor implements Player {

  @Override
  public void play() {
    System.out.println("Actor plays in a film.");
  }
}

public class Assignment2Q14 {
  public static void main(String[] args) {
    Child c = new Child();
    c.play();

    Musician m = new Musician();
    m.play();

    Actor a = new Actor();
    a.play();
  }
}
```

Output:

Child plays with Lego.
Musician plays a piano.
Actor plays in a film